COMMON FOUNDATIONS

Winter 2010
Volume 5, Issue 1

That Noise is Driving Me Crazy!

Community living has many benefits. It also involves certain compromises. One of the more challenging aspects for owners to come to grips with is noise pollution. Residents, often moving from single-family homes, are not used to hearing their neighbors. Sound transmitted between units or from the outdoors can be extremely annoying and disruptive. And while many features of the unit can be appreciated during a walk-through, the amount of sound transmission is not always apparent. In this issue of *Common Foundations*, we will address how to define acceptable levels of sound transmission and what can be done if those levels are exceeded.

FHA Reserve Requirements

After several delays, the Federal Housing Administration (FHA) has finally released Mortgage letter 2009-46B: Condominium Approval Process for Single-Family Housing. This document defines the requirements that a condominium must meet in order to be listed by the FHA as approved for FHA-insured mortgages. As mortgages have become more difficult to obtain, every condominium association should seek such approval. The list of approved associations may be found at https://entp.hud.gov/idapp/html/condlook.cfm. One of the issues that has evolved with the various releases of this document relates to reserve studies. In an earlier release, associations were required to maintain reserves at a 60 percent funding level. Subsequent versions eliminated the funding level requirement but substituted a requirement that a reserve study be performed. As released, however, the guidelines state (among other things) that the association budget "provides for the funding of replacement reserves for capital expenditures and deferred maintenance in an account representing at least 10% of the budget;..." "In cases where the budget documents do not meet these standards, the mortgagee may request a reserve study...." The 10% requirement is the same requirement that was established by FannieMae, which at least makes for consistency.

Where Does the Noise Come From?

If there is a perceived noise problem in your community, one of the first questions to ask is where is that noise coming from? Is the noise coming from the outside? Examples would be transportation-related noise such as highways, airplanes, or rail noise. It might also be transitory, like construction noise. And it might be seasonal, like outdoor activity, especially when windows are open.

Internal noises may be transferred between units or from common areas into each unit. Transmission between units may be via walls, ceilings, or floors. It may also occur as a result of mechanical chases or through the actual piping or ductwork itself.

When addressing noise issues, it is important to determine whether the problem is localized or omnipresent. Certain orientations may be more susceptible to noise issues than others. As well, certain parts of a building – those near fans or mechanical equipment, recreational areas, for example – may be more prone than others to experience problems. We have even found variations between units due to construction inconsistencies. For example, one area was built to specification and experienced no problems. Field modifications in another area of the same building created a problem.

What Types of Buildings Are Prone to Problems

Any building may experience sound transmission issues, but the biggest determining factors are the physical location, type, and quality of construction and the age of the building. If a development is built near a highway or a flight path, the resulting potential problems may be obvious and hopefully were addressed during the design stages. Wood-frame buildings are more problematic, as are older buildings, especially ones that were conversions from factories or warehouses, which can present particularly difficult problems. Structural components may promote sound transfer allowing it to pass unobstructed from unit to unit.

While some wall and ceiling assemblies are more effective than others, all must be assembled correctly with plenty of attention to detail. Care must be exercised to avoid "flanking paths" that allow sound to get around sound-deadening assemblies.

Defining the Problem

In a world where perception is reality, the first task is to define the problem. Is the noise that is causing complaints louder or more frequent than the occupants might reasonably expect? It is important to recognize that much of this is subjective. Different people will have different tolerances. The type of noise is also a concern – music, conversation, toilets flushing – each carries with it a relative level of acceptability.

There are, however, some relatively objective standards that have been developed by engineers and scientists to both quantify sound transmission and define acceptable levels.

The Sound Transmission Class (STC) is a value derived from creating and measuring the sound attenuation at various frequencies and comparing that to a standard reference. Whereas the STC measures sound transmission between areas separated by a common surface (walls, windows, etc.), the Apparent Sound Transmission Class (ASTC) is a more comprehensive measure in that it incorporates other pathways of sound transmission such as beams, columns, and chases for mechanical and electrical equipment and is generally the basis for field testing. The Impact Insulation Class (IIC), or Field Impact Insulation Class (FIIC), is a measure of impact-generated sound transmission through any surface, but typically floors. The Outdoor-Indoor Transmission Class (OITC) is similar to the STC except that it is used to measure the transmission from outdoor-generated noises (e.g., planes, trains, and automobiles).

The table below, which matches the building code, provides a general correlation of STC to audible levels of sound between spaces. In our experience, however, the code may underestimate the volume and levels of sound that residents find offensive.

Although measurements are made with highly sensitive equipment, the results can often be misleading, and almost never duplicate results obtained in a laboratory. The size and configuration of the room, as well as the existence of penetrations and other types of media, will greatly affect the sound attenuation.

STC	What Can Be Heard
25	Normal speech
30	Loud speech
35	Loud speech, but not intelligibly
40	Onset of "privacy"
42	Loud speech audible as a murmur
45	Loud speech not audible; 90% of statistical population "not annoyed"
50	Very loud sounds like instruments or stereos faintly heard; 99% of statistical population "not annoyed"
60+	Most sounds inaudible

The STC and the IIC have been incorporated into Section 1207 of the International Building Code (IBC). Typically, the code specifies values of 50 (or 45 if field-tested). However, codes are typically minimum levels and may not be high enough to produce comfortable noise control in multi-attached residential units. Designers and developers can always specify a higher STC than the code requires. The IBC is silent with regard to OITC.

What Can Be Done to Improve Sound Isolation Between Spaces?

Sound energy, like thermal energy, is best disrupted by creating breaks between spaces. Mass also plays a role in overall comfort. Generally, to improve Transmission Loss (i.e., the ratio of the sound energy striking the wall to the transmitted sound energy, as expressed in decibels), designers should seek to increase the weight of the surface layers and/or increase the distance between the surfaces.

Fiberglass insulation is often used, even in interior walls, to reduce sound transmission. Caulks and sealants are often used as well. Building walls in which the studs are offset and penetrations like electrical boxes and medicine cabinets are sealed can go a long way to improve the conditions. Drywall can be attached with resilient channels.

Dampening the source should also be considered. Many associations are beginning to establish minimum coverage of hard floors with carpeting, restrictions on hard-soled shoes, and set limits for sound levels from audio equipment. Other more sophisticated strategies like baffling can be employed.

Conclusion

Reducing sound transmission in an existing building, whether old or new, is much more difficult than including good sound transmission practice as part of new construction. Reduction of sound transmission in wood-framed buildings is generally more difficult than masonry or steel structures. Proper representation of what to expect in the building is important at the time of sale.

If problems arise, the first steps are to determine the existence of a real problem, attempt to quantify it, inspect to ensure that components were actually built as planned, and then hire a qualified consultant to recommend improvements.